Too WEIRD, Too Fast? Preprints about COVID-19 in psychology

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The study has been preregistered in an OSF repository and can be retrieved from [here](#).

Abstract

That behavioral sciences are overrepresented by some countries, in terms of samples and authors, is a well-documented finding. Considering the immediate policy implications, the present study aimed to scope whether this is true in the context of understanding the effects of the coronavirus as well. We assessed relevant preprints with “coronavirus” or “COVID-19” as keywords published on PsyArxiv between March-April, 2020, as well as between May-December, 2020 in terms of samples, participants, and authors. We found that some countries, such as the US, were overrepresented in both waves; papers based on authors from such countries, and employing samples from such countries were also more likely to be published in journals with higher impact factors, and were also more likely to be cited more. Implications, especially regarding a reductionist bifurcation of research as “WEIRD” or “non-WEIRD,” are discussed.

Keywords: metascience, preprints, open science, sample diversity, researcher diversity, coronavirus, COVID-19

Too WEIRD, Too Fast: Preprints about COVID-19 in the psychological sciences

Behavioral sciences are increasingly being used to inform policy across countries. Many practices from social and behavioral sciences have been extrapolated to understand how to change behaviors, including in the context of preventable infectious diseases, such as COVID-19.

However, most published and widely shared research in the behavioral sciences has been concentrated on a very small, homogeneous section of the population (e.g., Rad et al., 2018). As the COVID-19 pandemic spreads across the globe, many countries have relied on such research to communicate and use social norms (instead of hard laws) to nudge citizens to engage in hygiene practices. Interestingly, many researchers have also thrown their proverbial hat into the ring and have tried to assess, for example, how to communicate about the pandemic efficiently (e.g., Betsch, 2020; Lunn et al., 2020; Van Bavel et al., 2020).

In the case of a pandemic, where time and resources are scarce, and there is little empirical evidence for what definitely works and what does not, behavioral interventions might prove difficult. When time and resources are scarce, interpretations of policy could be biased (Mullainathan & Shafir, 2013). This issue is also exacerbated by the fact that poor methods and statistics continue to plague science (Smaldino & McElreath, 2016). No one is doubting the intentions of social and behavioral scientists, of course. However, there are many aspects of behavioral science that are circumspect. For instance, even in “normal” times, science is often conducted, interpreted, and disseminated by a homogenous group, from resource-heavy countries. Once exciting results are published and disseminated, the validity of such findings is rarely checked (but see Simonsohn et al., 2021). This is an enormous problem, and could possibly have disastrous consequences, especially during a global crisis. Instead of cross-validating their studies, many social scientists have collected

data within short periods of time and have already written and published their results in some form or the other (Ruggeri et al., 2020), when ideally, the process takes months, if not years.

Rigorous academic work celebrates its objectivity. However, how can science be considered objective if it is interpreted by a handful of people (Meadon & Spurrett, 2010) and overlooks a majority of the population? That research output about COVID-19 is heavily skewed has been previously discussed by a number of commentators. For instance, in economics, it is mostly senior male scientists who have been publishing pandemic-related working papers (Amano-Patiño et al., 2020). To check if the same holds true for psychology as well, we assessed papers published on PsyArxiv, a preprint repository. In other words, in the present set of studies, we ask: who is conducting and publishing results about COVID-19 in psychology? We do this using two waves of data. Wave 1 includes data from March and April, 2020; Wave 2 includes data till December, 2020. Specifically, we ask the following questions:

RQ1A. Who is conducting studies and publishing preprints about COVID-19?

B. Which of these preprints are being published, and in what journals?

RQ2A. Which samples are being used to study COVID-19 in psychology?

B. Which of these samples are being published, and in what journals?

RQs 1A and 2A are particularly assessed for Wave 1.

Sample Diversity in the Psychological Sciences

Although psychology is supposed to be a study of human behavior, it is very limited in accurately capturing the human population. Arnett (2008) has shown that, in the top six journals published by the American Psychological Association, 68% of the studies relied on US American samples, and 96% relied on WEIRD samples. In the 2015-16 issues of *Evolution & Human Behaviour* and *Evolutionary Psychology*, 81% of the samples were Western (Europe/North America/Australia), and 12% was from Japan (Pollet & Saxton,

2019). In 2012, 65% of the articles in *Evolution & Human Behaviour* were WEIRD (Kurzban, 2013). In the top five cross-cultural psychology journals, 64.6% of samples and 96.7% of participants were WEIRD in 2015-2016; 33.03% of these samples were based in the US (Veillard, 2017). Between 2006 and 2010, articles published in three top (by impact factor) experimental developmental psychology journals, 57.65% participants originated from the US, and 90.52% from WEIRD countries (Nielsen et al., 2017). In 2012, 96% of the papers published in *Journal of Personality and Social Psychology* were based on WEIRD samples (Kurzban, 2013).

Researcher Diversity in Psychological Sciences

When discussing issues of representation, it is also equally important to discuss who is producing this knowledge. Berry et al. (2002) have argued that psychology is culture-bound and culture-blind. In other words, it is limited to concepts and origins from a small subpopulation of the world, and thus, does not accurately depict human behavior. It is also limited in that it often ignores the influence of culture in understanding human behavior (see also Berry, 2013). One potential way to mitigate this oversight may be by collaborating with researchers from non-WEIRD countries.

However, previous work has indicated that there is a lack of diversity in researchers as well, defined in terms of authors of published manuscripts (mostly first/primary authors). For instance, in developmental psychology journals, 61% were first-authored by those with institutional affiliations in the US, 20% in English-speaking countries, 15% in non-English speaking European countries, 4% from Asia and Israel, and 2 articles had the first author located in Central or South America, but none in Middle East or Africa.

The Present Study

The present study, as discussed, aims to understand who is producing preprints about the coronavirus in the psychological sciences, and using which samples and populations. We do this by investigating the sample and participant characteristics of preprints on PsyArxiv as well as who authored these preprints. Data was collected in two waves: March-April, 2020 (i.e., within two months of the outbreak globally), and May-December, 2020.

However, bifurcating countries into WEIRD or non-WEIRD is reductionistic. For instance, how similar are US Americans and Cubans? Similarly, how similar are the Japanese and Indians? Technically, both groups would be clubbed together as “western” or “eastern.” Further, how similar are rural US Americans, Asian Americans, and economically disadvantaged US Americans? Though Singapore and Japan are often considered non-WEIRD countries, are they comparable to smaller-scale societies? Thus, a WEIRD-non-WEIRD classification may be inaccurate and oversimplified (also see Ghai, 2021).

Considering this enormous limitation, in this study we present two lists: List 1 countries are those that are typically coded as “WEIRD,” which includes the USA, Canada, the UK, Australia, and New Zealand. List 2 countries include those in List 1, but also Western European countries which are rich and democratic (Polity > 6; Marshall et al., 2017). Thus, a longer list of “WEIRD” countries was formed (Table S1).

Keeping in mind the limitations of this approach, for further clarity, we have also presented disaggregated results at the country-level. For instance, we present the number of samples, participants, and authors from each country in each wave of analysis.

Method

Data and Code Availability

Anonymized data and code for this paper are available on OSF at https://osf.io/4rfue/?view_only=3ac783758f334c4dae4b283c203631f5 (anonymous view only link)

Wave 1 (March-April 2020)

In attempting to understand the sampling and researcher diversity in preprints about coronavirus, two independent coders sourced papers published up to April 2020 on PsyArxiv, a preprint server for the psychological sciences in the first wave of data collection. To be clear, these papers have not been peer-reviewed and published in academic journals, as that process often takes months. However, preprints ensure rapid dissemination and visibility of research. At this stage, 40 preprints tagged “coronavirus” or “COVID-19” or “COVID” were sourced. These papers often represent sub-discipline diversity. Considering that, other than China, most countries detected their first cases between February and March 2020, an April deadline implies up to two months between conceptualization of the study and publication of the preprint.

The raters coded each manuscript for order of authorship (i.e., primary or secondary authors), the countries of authors’ institutional affiliation, their gender (based on institutional or other reports of pronouns, if available), and the samples used. If there were multiple studies in a single paper, the sample characteristics from each study were checked separately. That is, if a paper comprised three studies, all recruiting US Americans, we counted each study separately. If the author or the sample was affiliated to more than one country, each country was coded. This is in line with previous studies (e.g., Arnett, 2008). Commentaries were excluded from analyses. Similarly, papers with no verifiable data about affiliation or sex of the authors were excluded from the analysis. Finally, forty papers were identified for analysis. A total of sixty-nine studies involving human participant samples were identified across the forty papers.

Wave 2 (May-December, 2020)

Next, between March and May 2021, five coders traced each paper from Wave 1 to check which of them have been published and in which journals. Though imperfect, we used impact factors to assess the quality of journals, as done in previous studies.

Next, the coders sourced 597 preprints published on PsyArXiv between May and December, 2020 using the same protocol as in Wave 1. That is, commentaries, literature reviews, and other such papers without participants were excluded from analysis about samples or participants. However, online samples including data from Twitter were included in the analysis.

Results

Wave 1

Sample diversity

In the 65 studies, 21 countries were represented (Table 1A), and 14 studies included international samples or participants who were not disaggregated by country (Table S1). The number of disaggregated participants from each country ranged from 80 (Netherlands) to 250,855 (USA); the median number of participants was 540.

Table 1A. Sample diversity in Wave 1

Country	<i>N</i>		<i>Percentages</i>		
	Samples	Participants	Samples	Participants	Participants Per Sample
Austria	1	540	1.96	0.19	540
Canada	3	1728	5.88	0.61	576
China	4	10776	7.84	3.80	2694
Egypt	1	540	1.96	0.19	540
Italy	1	2053	1.96	0.72	2053
Japan	1	540	1.96	0.19	540
Kenya	1	540	1.96	0.19	540
Mexico	1	540	1.96	0.19	540
Netherlands	1	80	1.96	0.03	80
Nigeria	1	540	1.96	0.19	540

	<i>N</i>	<i>Percentages</i>			
Norway	1	4083	1.96	1.44	4083
Poland	2	454	3.92	0.16	227
Qatar	1	405	1.96	0.14	405
Romania	1	540	1.96	0.19	540
Russia	1	540	1.96	0.19	540
South Africa	1	540	1.96	0.19	540
South Korea	1	540	1.96	0.19	540
Sweden	1	540	1.96	0.19	540
Switzerland	1	540	1.96	0.19	540
UK	7	6430	13.73	2.27	918.57
USA	19	250855	37.25	88.53	13202.89
<i>Total</i>	51	283344	100	100	5555.76

Researcher Diversity

A total of 181 countries were represented (including one case of no information; see Table 1B). Of these, 40 researchers (22.10%) were based in the US, 12 (6.62%) in the UK, 29 (16.02%) in Germany, and 14 (7.73%) in China.

Publication status, citations, and impact factors

By May 2021, one paper with a Netherlands-based primary author was cited 140 times, whereas on an average US, Canada, and Germany-based papers were cited more. Of the papers where primary authors were US-based, 7 were published, and 6 were not. On an average, papers with Europe-based primary authors were published in journals with higher impact factors (see Table 1B).

Table 1B. Primary Authors' Countries of Affiliations (Wave 1)

Country	Not Published	Published	Total
Canada	2	1	3
China		4	4
Croatia		1	1
France	2		2
Germany	12	1	13
Italy		1	1
Netherlands		1	1
Norway	1		1
Poland		2	2
Slovakia		1	1

Country	Not Published	Published	Total
Slovenia		1	1
United Kingdom	2	1	3
United States	6	7	13
Grand Total	25	21	46

Median citations and impact factors across lists are presented in Table 1C.

Table 1C. Median citations and impact factors (Wave 1)

		Citations	Impact Factor
List 1	Includes non-WEIRD countries	23.5	2.685
	Does not include non-WEIRD countries	12	3.605
List 2	Includes non-WEIRD countries	25	2.503
	Does not include non-WEIRD countries	12	3.454
List 1	Exclusively non-WEIRD	33	2.294
	Not exclusively non-WEIRD	16.5	3.605

Wave 2

Sample diversity

A total of 614 papers had participants, and those were analyzed here. Next, 58.31% of the preprints had participants from List 1 countries, and 82.90% preprints had participants from List 2 countries. Further, 78.18% preprints included at least some participants from non-List 1 countries, such as India and Bangladesh. Sample data collected from before 2020 (e.g., longitudinal studies) were deleted from the analysis. A total of 36,909,784 participants were employed in the various studies (range=1 to 3,24,00,000 participants; Mean=64079.49, Median=690.5).

The median number of participants from List 1 countries was 750, and 570 for those not from List 1; however, this was not a significant difference ($X^2(1) = 2.33$, $p = .127$). There was a significant difference ($X^2(1) = 13.364$, $p < .001$) in the median sample sizes of samples from List 2 countries. A country-wise break-up of samples is included in Table 2A.

Table 2A. Country-wise distribution of samples in Wave 2 preprints.

Countries	Frequencies	N	Countries	Frequencies	N
"At Home"	1	1	Ireland, UK, and USA	1	234
Australia, Brazil, Canada, France, Germany, Hong Kong, India, Japan, Mexico, the United	1	1411200	Israel	8	1878

Countries	Frequencies	N	Countries	Frequencies	N
Kingdom, and the United States					
150 Countries	1		Italy	31	56378.09
20 Countries	1	38910	Japan	16	19343
22 countries	1	1759	Kenya	3	1050
29 countries	1	140	mainly Germany, Switzerland and Austria	1	2640
47 Countries	2	176362	Malaysia	1	895
49 Countries	1	50966	Malta	1	219
55 countries	1	25488	Mexico	1	102
55 countries	1	3593	Middle East	2	3
6 countries	1	348	Middle East (incl. Israel)	1	11
69 Countries	1	23629	Nepal	1	149
8 Countries	1	9889	Netherlands	17	10160
Africa	1	2	New Zealand	12	7537
Argentina	3	2388	Nigeria	3	2341
Argentina, Australia, Brazil, Canada, France, Germany, Greece, Indonesia, Italy, Japan, Netherlands, Philippines, Romania, Russia, Saudi Arabia, Serbia, South Africa, South Korea, Spain, Turkey, the United Kingdom, Ukraine, and the United States of America	1	1000	North America	3	608
Armenia	1	348	Northern Ireland	1	10
Asia	3	46	Norway	10	46572
Asia (incl. India)	1	5	Other European Nationals	2	
Australia	23	13052	Outside France	1	55
Australia, Canada, UK, USA	1	728	Pakistan	1	200
Australia/ New Zealand	4	87	Pan-America	1	254
Austria	6	583	Peru	2	446
Bangladesh	3	2694	Philippines	2	1530
Belarus	3	3674	Poland	29	28089
Belgium	10	1929	Portugal	6	489
Bolivia	1	242	Republic of Ireland	5	9883
Bosnia and Herzegovina	4	1684	Romania	1	2704
Brazil	8	26577	Russia	3	4419
Budapest	1	77	Scotland, Wales and Northern Ireland	1	14
Bulgaria	2	2413	Scotland	3	1511
California	1	450	Serbia	2	445
Canada	24	15607	Siberia	1	754
Canada, Ireland	1	16	Singapore	1	505
China	21	26988	Slovakia	1	783
Colombia	3	1632	South America	3	25
Continental Europe	1	400	South Korea	5	4296
Costa Rica	2	2	South-East Asia Region	1	259

Countries	Frequencies	N	Countries	Frequencies	N
Croatia	8	4140	Southern China	1	152
Czech Republic	8	12656	Spain	16	9090
Denmark	15	81215	Spain	1	48
Denmark, France, Hungary, Italy, Sweden, UK, USA	1		Sub-Sahara Africa	3	23
Eastern Mediterranean Region	1	459	Sweden	8	31705
Egypt	1	96	Switzerland	15	15514
England	6	1920	Not specified	11	415836
English respondents	1	138	Taiwan	1	957
Estonia	4	10	Turkey	6	6511
Ecuador	1	249	UAE	1	1585
Europe	4	1401	UK	71	354271
Europe and Russia	2	2202	UK / Ireland	1	190
Europe or Eurasia	1	202	UK and Belgium	1	340
Finland	4	424	UK and Northern Island	1	11263
France	24	36367	UK, Poland and other EU countries	1	497
Germany	50	29106220	Ukraine	4	3405
Germany, Netherlands, Italy, Pakistan	1	24	Unknown	1	4
Germany, United Kingdom, Ireland, Italy, and Pakistan	1	43	USA	192	4291340
Global	1	6675	USA and India	1	305
Greece	5	4718	USA and UK	4	1159
Hong Kong	4	2593	Vietnam	1	341
Hungary	7	13797	Wales	1	8
India	8	3481	Western Pacific Region	1	326
Indonesia	6	3965	(blank)		599
International (54 countries)	1				
Iran	3	417			
Ireland	7	4923			
Ireland, Scotland, Wales	1	30			

Researcher Diversity

A total of 3002 studies were coded, 17 of which did not have researcher countries identified. Of the remaining 2985, 2.24% authors had institutional affiliations from multiple countries. Of the 2918 authors who were affiliated to a single country, 28.27% were affiliated to the US, 6.34% to Germany and the UK each (an additional 5.82% affiliated with England, .71% to Scotland, .03% to Wales, and 1.06% to Northern Ireland), and 5.14% were affiliated to the Netherlands. Table 2B represents all coded countries and Table S2A includes

disaggregated results for authors with multi-country affiliations. Table S2B includes multi-country affiliations that are not disaggregated.

Table 2B. Countries represented in preprints between May and December 2020.

Country of Institutional Affiliation	N	Percentage	Country of Institutional Affiliation	N	Percentage
USA	825	28.27	Luxembourg	10	0.34
Germany	185	6.34	Republic of Ireland	10	0.34
UK	185	6.34	Portugal	9	0.31
England	170	5.83	Croatia	8	0.27
Netherlands	150	5.14	Pakistan	8	0.27
Italy	123	4.22	UAE	8	0.27
China	111	3.80	Finland	6	0.21
Australia	106	3.63	Iran	6	0.21
Poland	106	3.63	Korea	6	0.21
Canada	89	3.05	Taiwan	6	0.21
New Zealand	58	1.99	Bosnia and Herzegovina	5	0.17
Switzerland	54	1.85	Slovakia	5	0.17
France	53	1.82	Greece	4	0.14
Denmark	51	1.75	Canada	3	0.10
Norway	46	1.58	Colombia	3	0.10
Ireland	45	1.54	Belgique	2	0.07
Spain	45	1.54	Estonia	2	0.07
Japan	41	1.41	Kenya	2	0.07
Bangladesh	37	1.27	Peru	2	0.07
Israel	31	1.06	Slovenia	2	0.07
Northern Ireland	31	1.06	Vietnam	2	0.07
Hungary	29	0.99	Bolivia	1	0.03
India	22	0.75	Bosnia	1	0.03
Scotland	21	0.72	Bulgaria	1	0.03
Austria	18	0.62	Czechia	1	0.03
Czech Republic	18	0.62	Ecuador	1	0.03
Belgium	17	0.58	Jordon	1	0.03
Brazil	17	0.58	Lithuania	1	0.03
Serbia	16	0.55	Malaysia	1	0.03
Turkey	16	0.55	Malta	1	0.03
South Korea	15	0.51	Moldova	1	0.03
Singapore	14	0.48	Sharjah	1	0.03
Sweden	14	0.48	Slovak Republic	1	0.03
Indonesia	12	0.41	South Africa	1	0.03
Hong Kong	11	0.38	Thailand	1	0.03
Nigeria	11	0.38	Ukraine	1	0.03
			Wales	1	0.03

Further, 1592 authors (53%) belonged to WEIRD countries, and 1410 (47%) to non-WEIRD countries, based on List 1 countries. When List 2 is considered, 2593 (86.38%) authors belonged to WEIRD countries, and 409 (13.62%) to non-WEIRD countries.

Publication status, citations, and impact factors

By May 2021, 38.2% preprints were published. Table 2C presents a country-level distribution of published and unpublished preprints. Out of the published preprints, 57.05% authors belonged to List 1 countries, and 87.89% to List 2 countries. Mean and median citations between primary authors from List 1 countries and those not from List 1 were not significantly different; however, the median citations were not significantly different between the two sets (Table 2D). On the other hand, mean and median citations for primary authors from List 2 countries was significantly higher than those not from List 2 countries (Table 2D).

Table 2C. Country-level distribution of published and unpublished papers

Country of Institution	Not Published	Published	Country of Institution	Not Published	Published
Australia	52	54	Lithuania		1
Australia, UK	2		Luxembourg	7	3
Australia, USA	1		Malaysia	1	
Austria	14	4	Malta	1	
Austria, Canada	1		Moldova		1
Austria, Switzerland	2		No Information	16	1
Bangladesh	16	21	Netherlands	120	30
Bangladesh, UK		1	Netherlands, Germany	1	
Bangladesh, USA		1	Netherlands, USA	4	
Belgique	2		New Zealand	29	29
Belgium	5	12	New Zealand, Brazil	1	1
Bolivia		1	New Zealand, Germany	2	
Bosnia	1		Nigeria	8	3
Bosnia and Herzegovina	5		Northern Ireland	21	10
Brazil	9	8	Northern Ireland, UK	6	4
Bulgaria	1		Norway	33	13
Canada	61	28	Norway, Germany		1
Canada	2	1	Pakistan	6	2
Canada, Sweden	1	1	Peru		2
China	69	42	Poland	83	23

Country of Institution	Not Published	Published	Country of Institution	Not Published	Published
Colombia	2	1	Poland, Germany	1	
Croatia	7	1	Portugal	9	
Czech Republic	11	7	Republic of Ireland	10	
Czechia	1		Scotland	11	10
Denmark	35	16	Serbia	3	13
Denmark, Netherlands		1	Sharjah	1	
Ecuador		1	Singapore	9	5
England	103	67	Slovak Republic		1
England, Australia		1	slovakia	2	3
England, Poland, Portugal		2	Slovenia		2
Estonia		2	South Africa		1
Finland	6		South Korea	15	
France	36	17	Spain	25	20
France, Italy, South Korea	1		Sweden	12	2
Germany	108	77	Sweden, Australia		1
Germany, Estonia		1	Switzerland	30	24
Germany, Netherlands	1		Switzerland, Canada, UK	1	
Germany, Norway		1	Switzerland, Poland	1	
Germany, Switzerland	1	3	Taiwan		6
Germany, UK	1	1	Thailand	1	
Germany, USA	2		Turkey	6	10
Greece	3	1	Turkey, UK		1
Hong Kong	10	1	UAE	8	
Hungary	20	9	UK	148	37
India	13	9	UK, Belgium		1
Indonesia	12		UK, Italy		1
Iran	5	1	UK, Norway	1	
Ireland	23	22	UK, USA		1
Israel	22	9	Ukraine	1	
Israel, USA		1	USA	451	374
Italy	60	63	USA, Australia	1	1
Italy, Spain	1	1	USA, Bangladesh		2
Japan	26	15	USA, Canada		2
Japan, Indonesia	1		USA, Chile	1	
Jordon	1		USA, UK	1	
Kenya	2		Vietnam	2	
Korea	6		Wales		1

Table 2D. Mean and median citations and impact factors

		List 1					List 2				
		M	SD	Median	t	X2	M	SD	Median	t	X2
Citations	WEIRD	12.48	60.42	1	-0.15	0.004	13.04	52.77	1	-2.24*	6.22**
	non-WEIRD	11.91	34.99	1			6.24	17.67	0		
Impact Factors	WEIRD	3.76	2.7	2.74	-2.25*	*	3.56	2.42	2.74	-2.81**	**
	non-WEIRD	3.02	1.87	2.47			2.35	1.77	2.21		

Discussion

The current study assessed the researcher and sample diversity in preprints about COVID-19 in psychology, hosted on PsyArxiv. We found that countries such as Germany and the US had a greater number of researchers as well as samples and participants across time. In the first two months since COVID-19 became a pandemic (March-April 2020), a total of 65 studies were conducted and published as preprints, mostly with authors and samples from western and developed countries. Further, primary authors from these countries also showed higher median citations and published in journals with higher impact factors.

The preliminary analysis of papers published in the earlier stages of the pandemic is very much in line with previous studies that report an overreliance on samples from the US in published papers across the subdisciplines of psychology (e.g., Arnett, 2008; Veillard, 2017). It could be contended that there could have been opportunity costs for many researchers who could have spent their resources in other ways. However, that is the root of our argument - this is true of researchers from the overrepresented countries as well. It is a known fact that often preliminary, novel findings are publicized and enter our collective imagination; any refutations or alternative findings, especially from other countries are thought to be endogenous to these “cultures” and are often not published in top journals (see Arnett, 2008; Rad et al., 2018). This exercise could be construed as a critique of fast science, in that we wanted to explore to what extent preliminary findings are published fast, and who is

publishing them. This is also in line with what we found with respect to citations and journal impact factors of preprints that were published.

In the next stages of the pandemic (May-December 2020), a similar trend was observed with respect to citations as well as impact factors, in that, authors from western, developed countries, including France and Germany, had published in “top” journals, and were cited more. Further, there was also a higher number of samples as well as median sample sizes from western, developed countries. This shows the overreliance of samples as well as trust in science by authors from such countries, which is not necessarily dependent on who is producing preprints.

This is also in line with the general finding that psychology is dominated by authors from the US. It has been argued before that when applying such science to policies, caution needs to be exercised. Particularly, this also affects generalizability of theories in the psychological sciences (IJzerman et al., 2020, 2021).

It is also important to note that researchers in developing countries often face issues relevant to the nascency of the scientific process. For instance, research infrastructure is often underdeveloped and research funds are limited (see Onie, 2020). These exacerbate the problems with understanding human behavior more broadly. For instance, without specific measures and theories that are not invariant across countries, it may be difficult for researchers from countries where psychological science has not yet developed to operate. A related problem is also in studying constructs in a culture-blind manner (Berry et al., 2002), wherein even though constructs may not be culture-blind, they are assumed to be so based on previous work focusing on specific countries such as the US. Similarly, constructs not relevant to the “mainstream” frameworks of psychology, such as caste in India, are not studied. Further, underrepresented or Eastern countries East are usually studied as absolutes,

which is also reductionistic. In other words, a narrow lens, for example, based on researchers in the US, is usually employed to study other countries.

In this light, it is also important to note the limitations of this study. First, though authors, samples, and participants were assessed, we were unable to assess the constructs, and whether there was diversity in the constructs studied. For example, were authors from countries with indigenous populations able to assess constructs specific to such populations. Relatedly, we were unable to assess whether there were within-country representation across countries. Further, many preprints did not indicate specific countries that were sampled, reducing accuracy, indicating that better standards for reporting of samples in psychological sciences are required. Next, only COVID-19-related manuscripts were assessed. It is possible that authors from other countries did not focus on research related to the coronavirus. This is in line with other issues such as a lack of research infrastructure and funding in some countries, which could have made it more difficult for these researchers to conduct research related to coronavirus in such a short span. Further, we only concentrated on preprints in English, and could not consider those in other languages. Future research should attempt to assess languages other than English. Next, we only assessed preprints published on PsyArxiv. It is possible that only certain researchers from some countries have started putting up their working papers onto a repository such as PsyArxiv. Future work may consider papers that are peer-reviewed and published, considering that not every paper is published as a working paper due to various institutional and grant-related constraints. We assessed journal quality and preprint impact using citations and impact factors, both of which are imperfect metrics. Future research could assess which preprints or published papers are used to create policies at local, national, and global levels.

Where, then, does this leave us? If psychological science is needed to inform policy, it is imperative that the science itself is unshakable. This is especially true in the case of

immediate danger, as seems to be the case with the pandemic. If most researchers concentrate on collecting data from a few countries, and derive insights based on restricted sampling, scientific objectivity is questionable. It is also vital that researchers collect data about the countries and ethnicities of their participants, so that constraints on generalizability are clearer.

Conclusion

The present study assessed preprints published on PsyArXiv in two waves: immediately after the onset of the pandemic across the world, and between two and ten months after its onset. We found that in the first wave, there was an overrepresentation of authors and samples from the US and Germany. In the second wave, though more geographical diversity was found, authors and samples from developed and European countries were overrepresented.

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AP contributed to the conception, design, analysis and interpretation of data, as well as drafting of the manuscript.

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Competing Interests

No particular competing interests. However, the author resides and works in a “non-WEIRD” country.

Data Accessibility Statement

Data and code linked to this manuscript is openly available [here](#).

Supplementary Tables

Table S1A. Countries in List 2

Countries	
Czech Republic	Lithuania
<i>Australia*</i>	Luxembourg
Austria	Malta
Belgique	Moldova
Belgium	Netherlands
Bosnia and Herzegovina	<i>New Zealand</i>
Bulgaria	<i>Northern Ireland*</i>
<i>Canada*</i>	Norway
Croatia	Poland
Czech Republic	Portugal
Czechia	<i>Republic of Ireland*</i>
Denmark	<i>Scotland*</i>
<i>England*</i>	Serbia
Estonia	Slovak Republic
Finland	Slovakia
France	Slovenia
Germany	Spain
Germany	Sweden
Greece	Switzerland
Hungary	<i>UK*</i>
Ireland	<i>US*</i>
Italy	<i>Wales*</i>

*Countries in italics and marked with an asterisk are included in List 1 as well as List 2

Table S2A. Disaggregated list of countries for authors with multi-country affiliations.

Country	N	%		Country	N	%
US	841	27.448		Portugal	11	0.359
UK	205	6.691		Luxembourg	10	0.326
Germany	201	6.56		Republic of Ireland	10	0.326
England	173	5.646		Croatia	8	0.261
Netherlands	157	5.124		Pakistan	8	0.261
Italy	127	4.145		UAE	8	0.261
China	111	3.623		Finland	6	0.196
Australia	110	3.59		Iran	6	0.196
Poland	110	3.59		Korea	6	0.196
Canada	95	3.101		Taiwan	6	0.196
New Zealand	62	2.023		Bosnia and Herzegovina	5	0.163
Switzerland	62	2.023		Slovakia	5	0.163
France	54	1.762		Greece	4	0.131
Denmark	52	1.697		Canada	3	0.098
Norway	49	1.599		Colombia	3	0.098
Spain	47	1.534		Estonia	3	0.098
Ireland	45	1.469		Belgique	2	0.065
Japan	42	1.371		Kenya	2	0.065
Bangladesh	41	1.338		Peru	2	0.065
Northern Ireland	41	1.338		Slovenia	2	0.065
Israel	32	1.044		Bolivia	1	0.033
Hungary	29	0.946		Bosnia	1	0.033
India	22	0.718		Bulgaria	1	0.033
Austria	21	0.685		Chile	1	0.033
Scotland	21	0.685		Czechia	1	0.033
Brazil	19	0.62		Ecuador	1	0.033
Belgium	18	0.587		Jordon	1	0.033
Czech Republic	18	0.587		Lithuanina	1	0.033
Turkey	18	0.587		Malaysia	1	0.033
NA	17	0.555		Malta	1	0.033
Sweden	17	0.555		Moldova	1	0.033
Serbia	16	0.522		Sharjah	1	0.033
South Korea	16	0.522		Slovak Republic	1	0.033
Singapore	14	0.457		South Africa	1	0.033
Indonesia	13	0.424		Thailand	1	0.033
Hong Kong	11	0.359		Ukraine	1	0.033
Nigeria	11	0.359				

Table S2B. List of multi-country affiliations for authors in List 2

Country of Institutional Affiliation	N	Percentage	Country of Institutional Affiliation	N	Percentage
USA	825	27.48	Belgique	2	0.07
Germany	185	6.16	Canada, Sweden	2	0.07
UK	185	6.16	England, Poland, Portugal	2	0.07
England	170	5.66	Estonia	2	0.07
Netherlands	150	5	Germany, UK	2	0.07
Italy	123	4.1	Germany, USA	2	0.07
China	111	3.7	Italy, Spain	2	0.07
Australia	106	3.53	Kenya	2	0.07
Poland	106	3.53	New Zealand, Brazil	2	0.07
Canada	89	2.96	New Zealand, Germany	2	0.07
New Zealand	58	1.93	Peru	2	0.07
Switzerland	54	1.8	Slovenia	2	0.07
France	53	1.77	USA, Australia	2	0.07
Denmark	51	1.7	USA, Bangladesh	2	0.07
Norway	46	1.53	USA, Canada	2	0.07
Ireland	45	1.5	Vietnam	2	0.07
Spain	45	1.5	Australia, USA	1	0.03
Japan	41	1.37	Austria, Canada	1	0.03
Bangladesh	37	1.23	Bangladesh, UK	1	0.03
Israel	31	1.03	Bangladesh, USA	1	0.03
Northern Ireland	31	1.03	Bolivia	1	0.03
Hungary	29	0.97	Bosnia	1	0.03
India	22	0.73	Bulgaria	1	0.03
Scotland	21	0.7	Czechia	1	0.03
Austria	18	0.6	Denmark, Netherlands	1	0.03
Czech Republic	18	0.6	Ecuador	1	0.03
Belgium	17	0.57	England, Australia	1	0.03
Brazil	17	0.57	France, Italy, South Korea	1	0.03
NA	17	0.57	Germany, Estonia	1	0.03
Serbia	16	0.53	Germany, Netherlands	1	0.03
Turkey	16	0.53	Germany, Norway	1	0.03
South Korea	15	0.5	Israel, USA	1	0.03
Singapore	14	0.47	Japan, Indonesia	1	0.03
Sweden	14	0.47	Jordon	1	0.03
Indonesia	12	0.4	Lithuania	1	0.03
Hong Kong	11	0.37	Malaysia	1	0.03
Nigeria	11	0.37	Malta	1	0.03
Luxembourg	10	0.33	Moldova	1	0.03
Northern Ireland, UK	10	0.33	Netherlands, Germany	1	0.03

Republic of Ireland	10	0.33	Norway, Germany	1	0.03
Portugal	9	0.3	Poland, Germany	1	0.03
Croatia	8	0.27	Sharjah	1	0.03
Pakistan	8	0.27	Slovak Republic	1	0.03
UAE	8	0.27	South Africa	1	0.03
Finland	6	0.2	Sweden, Australia	1	0.03
Iran	6	0.2	Switzerland, Canada, UK	1	0.03
Korea	6	0.2	Switzerland, Poland	1	0.03
Taiwan	6	0.2	Thailand	1	0.03
Bosnia and Herzegovina	5	0.17	Turkey, UK	1	0.03
Slovakia	5	0.17	UK, Belgium	1	0.03
Germany, Switzerland	4	0.13	UK, Italy	1	0.03
Greece	4	0.13	UK, Norway	1	0.03
Netherlands, USA	4	0.13	UK, USA	1	0.03
Canada	3	0.1	Ukraine	1	0.03
Colombia	3	0.1	USA, Chile	1	0.03
Australia, UK	2	0.07	USA, UK	1	0.03
Austria, Switzerland	2	0.07	Wales	1	0.03